1. Exercise 6.1.1 from Pressley

2. Exercise 6.1.3 from Pressley

3. Exercise 6.1.4 from Pressley

4. Let $S$ be a surface of revolution with axis of revolution $\ell$. Show that rotations about $\ell$ are isometries of $S$.

5. Consider the surface patch 
   \[ \sigma(u,v) = (u \cos v, u \sin v, \log \cos v + u), \quad u \in \mathbb{R}, \quad -\frac{\pi}{2} < v < \frac{\pi}{2}. \]
   Let $v_1, v_2 \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ be arbitrary and define the curves $\gamma_1, \gamma_2$ by $\gamma_i(u) = \sigma(u, v_i)$ ($u \in \mathbb{R}$). Show that for arbitrary $u_1, u_2$, the arc-lengths of $\gamma_1 : [u_1, u_2] \to S$ and $\gamma_2 : [u_1, u_2] \to S$ are the same.

6. Let $P$ be the $xy$-plane minus the non-negative $x$-axis, parametrized by polar coordinates $(\varrho, \theta)$, where $\varrho > 0$ and $0 < \theta < 2\pi$. Compute the first fundamental form of $S$ in this parametrization.